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CHROMATOGRAPHY AS ONE OF THE METHODS OF ANALYTICAL CHEMISTRY

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Modern analytical methods of analyses including chemical (gravimetry, titrimetry), spectroscopic (atomic and molecular spectroscopy, radiospectroscopy), electrochemical (potentiometry, coulometry, voltammetry, conductometry) methods, chromatography and electrophoresis. Each method has application in different fields. For example, electrochemical methods are used in biology, medicine, environmental monitoring (voltametric methods is used in analytical control of surface and waste water). Problems of atomic, isotopic, molecular, phase analysis are solved by spectroscopic methods.

Chromatography – the most important and widely used analytical method. Chromatography is a physico-chemical separation method based on components partition between two phases: stationary phase and mobile phase. Stationary phase is a solid (sorbent) or a liquid film coated on solid surface. Mobile phase is an inert gas or a liquid passing through the stationary phase. The sample is injected into the mobile phase. As it moves with the mobile phase, the sample's components partition themselves between the mobile and stationary phases. Those components whose distribution ratio favors the stationary phase require a longer time to pass through the system. So components spend different times in column and are separated in a certain order.

Chromatographic separations can be classified in three ways:

1. by the physical state of the mobile phase and stationary phase (gas-liquid chromatography, liquid-liquid chromatography);
2. by the method of contact between the mobile phase and stationary phase (column chromatography, planar chromatography);
3. by the chemical or physical mechanism responsible for separating the sample's components (adsorption chromatography, partition chromatography, ion-exchange chromatography, size-exclusion chromatography).

Today chromatographic methods allow to solve many analytical problems.

Adsorption high performance liquid chromatography (HPLC) find a use for analysis of amino acids, protides, medicines, polycyclic hydrocarbon in the atmosphere. Size-exclusion chromatography is widely used in research of polymeric compounds, its molecular weight determination, in biology and medicine for analysis of blood and protides. Ion-exchange chromatography is the method for separation organic and inorganic ions. Partition chromatography is applied in such fields, as pharmacy, biochemistry, criminalistics, analyses of industrial gases (aromatic polycyclic hydrocarbon, polychlorinated biphenyls).

Gas chromatography is effective method for separating components of the same class (hydrocarbons, alcohols, organic acid). It is often used in petroleum chemistry (analysis of benzene), at determination of pesticides, fertilizers, vitamins, medicinal agents and others.

What is more, gas chromatography allows to solve not only analytical problems, but it is the instrument of analysis for scientific research, especially if we consider our unique region.

Siberian region is rich in plant raw materials, including numerous species medicinal plant. They are widely used in a medicine and are being a source for obtaining different types

of biologically active substances. Essentially medicinal plants are related to odoriferous plants, and may contain from 0,01 to 20 % of volatile oils.

Volatile oils are represented as multicomponent mixture of volatile aromatic materials and various organic compounds relating to aliphatic, alicyclic, aromatic and heterocyclic compounds. Hydrocarbons, alcohols, acids, aldehydes, ketones, simple and compound ethers can be found among organic compounds.

First of all it is interesting to know qualitative and quantitative composition of volatile oils. Gas chromatography with mass-spectrometer detector (GC/MS) is the most important method of analysis of volatile organic materials. This method allows detect organic compounds of different classes. GC/MS is one of more effective methods due to short analysis time.